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Review of the

Chief Joseph Dam Hatchery Program Master Plan

Project # 2003-023-00

Step One of the Northwest Power and Conservation Council's Three-Step Review Process

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Background

At the Northwest Power and Conservation Council's June 2004 request, the ISRP reviewed the Confederated Tribes of the Colville Reservation (Colville Tribes) Master Plan for the Chief Joseph Dam Hatchery Program, Project # 2003-023-00. This is a Step 1 review in the Council's Three Step Review Process. Step 1 is the feasibility stage, and all major components and elements of a project should be identified. This review focuses on the Colville Tribe's responses to the Step 1 scientific review elements specified by the Council (Chapter 3 of the Master Plan provides a reference to the review elements).

This project was formed from two proposals submitted for the Columbia Cascade Province project selection process to address fish propagation, fish harvest, and research monitoring and evaluation needs in the Okanogan subbasin -- Proposal #29040 *Develop and Propagate Local Okanogan River Summer/Fall Chinook*, and #29033 *Design and Conduct Monitoring and Evaluation Associated with the Reestablishment of Okanogan Basin Natural Production.* These proposals received favorable ISRP reviews and support from the Council, CBFWA, NOAA, and eventually BPA. Subsequently, the Colville Tribes, Council, and Bonneville agreed to add a separable spring Chinook component to the master planning effort. The spring Chinook component is presented in a single separate chapter in the Master Plan and all costs and facility requirements are presented as separable components. The ISRP review considers both the fall/summer and spring Chinook components.

Review Summary and Recommendations

This project is advertised to contribute to three primary objectives: 1) restore Summer/Fall Chinook to their historic habitats; 2) restore stable ceremonial and subsistence fishing (especially the First Fish Ceremony); 3) assist the recovery of Listed ESU Spring Chinook in the upper Columbia. As presented, the integrated recovery program actions are intended to supercede integrated harvest actions. The primary need for the integrated recovery program emerges from loss of Summer/Fall Chinook above Chief Joseph Dam and Grand Coulee Dam, as well as the cumulative impact of downstream and upstream mortality associated with the nine lower hydropower dams to remaining populations particularly in the Okanogan subbasin. While the Summer/Fall Chinook ESU is not presently deemed either Threatened or Endangered, recent negative population trends indicate that the Okanogan and related up-river populations are depressed. To address this trend, the Master Plan calls for construction and operation of a production facility (and associated acclimation ponds) near the Chief Joseph Dam tailrace.

The purpose of the integrated harvest program is to provide a harvestable surplus for Confederated Colville Tribes ceremonial and subsistence purposes (and perhaps for non-tribal recreation purposes). These purposes require surplus production above the minimum naturally spawned 4,700 adults targeted for sustainability under the integrated recovery program. Ultimately, the ceremonial and subsistence harvest entitlements will shape the size and scope of the entire Summer/Fall Chinook project. While a long-term goal includes ceremonial and subsistence (and recreational) harvest of naturally spawned adults, a transitional goal includes a

selective harvest of marked, surplus hatchery fish. Such harvests meet cultural needs while addressing potential density-dependent ecological hazards from hatchery fish due to interactions with their wild counterparts.

The integrated recovery program will operate in a supplementation mode and is fairly consistent with ISAB's Eight Recommendations for Supplementation[1] with a couple of notable exceptions. Specifically, the program fails to identify under what circumstances (if any) the program will be terminated. No specific time frame is offered to reach annual adult escapement targets. While there is considerable uncertainty and lack of control of out-of-basin variables, there is most certainly a reasonable range of time expected under a select few scenarios. Alternately, if there is an observable reduction in wild fish spawning or production of juveniles after commencement of the supplementation program (even though total returns and escapement may increase), then this will be a primary indicator that supplementation is interfering with natural production. Such observations should be the kind of realized hazard that would lead to suspension of the releases.

Also, while the Master Plan recognizes the role of adaptive management philosophies, there are some vital kinds of decision data that will not be readily available (such as an appropriate reference population to serve as a control – the project sponsors may wish to comment on this). The Master Plan formally recognizes a number of key attributes for managing salmon consistent with their evolutionary history. First, the Master Plan recognizes the power of using locally adapted stock and natural-origin adults as brood to avoid numerous risks associated with mixing and domestication effects. Second, the Master Plan recognizes the importance of using standardized 1:1 mating schemes to maximize within-population diversity. Third, the Master Plan also recognizes the critical need for mimicking the diversity of life history phenotypes historically present in the population. Fourth, the Master Plan recognizes the need for introducing environmental variation into the propagation cycle through the use of a dispersed series of planned acclimation ponds, which will expose young to more normalized selective pressures and permit volitional out-migration. Lastly, the Master Plan recognizes the need to aggressively pursue watershed-level habitat improvements as well as out-of-basin improvements to the hydrosystem and down-river harvest pressures.

On its face, the Master Plan is fairly exhaustive in its treatments of the historical background and technical specifications for the infrastructure desired for the project. The Master Plan articulates a well-justified basis (apparently on legal grounds) for construction of a hatchery as mitigation for construction and operation of Grand Coulee Dam. Mitigation was originally conceived to compensate the Colville Confederated Tribes for the lost access to traditional ceremonial and subsistence fishing grounds. Construction and inundation of upriver spawning grounds also contributed to decline of local stocks and lost fishing opportunity.

While construction and operation of a hatchery program apparently is the solely specified mitigation activity required, the Master Plan should address why or how this alternative will stack up to other forms of mitigation (e.g., modified main or subbasin hydrological regime up or down river, improved passage down river, habitat improvements, harvest management, etc.).

[1] ISAB 2003-3: Review of Salmon and Steelhead Supplementation. www.nwcouncil.org/library/isab/isab2003-3.htm. See pages xii - xiv.

For example, the ISRP is aware that in other venues one potential alternative, providing passage for anadromous fishes at Chief Joseph and Grand Coulee dams, is being evaluated. Whether either option is preferred and warrants focus or perhaps is even interdependent (i.e., affect each other's assumptions) is an important consideration to illuminate.

The Master Plan benefits from a foundation laid by development of the Habitat Conservation Plans (HCPs) developed among entities affected by three of the mid-Columbia PUD dams, Wells, Rocky Reach and Rock Island. In the process of development of the HCPs, the parties addressed the subject of hatcheries as a means of mitigation for losses of salmonids due to construction and operation of the dams. A so-called BAMP document was prepared which spells out an "umbrella" strategy to govern the construction and operation of hatcheries for mitigation in the mainstem and/or tributaries to the Columbia River above Rock Island Dam. Thus many of the issues raised in the Council's Step 1 process have been dealt with previously and should be appropriately referenced unless subsequent analyses have negated those previous considerations. The plan mentions that it departs from the BAMP recommendations in some particulars, but does not describe them. Rather the text simply refers the reader to a separate document. This important issue merits fuller description.

The Master Plan benefits from the inclusion of two specific Hatchery Genetic Management Plans (HGMPs) for Summer/Fall Chinook recovery and for Spring Chinook recovery. While no such plan is perfect or can anticipate every contingency, presentation on these issues demonstrates some appropriate forward thinking. The Master Plan also benefits from some important philosophical principles based on modern understanding of salmon biology. These include a basic recognition that Chinook runs have important spatial, temporal/seasonal, and life-history dimensions, and need to be managed as such.

Ultimately, however, the Master Plan would benefit from further description of its relevance to and direct integration with other Council and basin-wide documents. The ISRP, therefore, recommends revision of the Master Plan to reflect these other efforts and how the proposed mitigation measures will fit within the broader planning contexts, such as subbasin and provincial planning.

Specifically, the relationship between the Master Plan and the Okanogan Subbasin Plan[2] is not transparent. The ISRP recognizes the timing of the two efforts was, perhaps, not opportune for thorough and complete integration, however, there was certainly opportunity for communication. Regardless, the next draft of the Master Plan will need to reflect such a context. One area within the Subbasin Plan that would be most appropriate to this effort is the determination and prioritization of limiting factors. A hatchery program may or may not be the appropriate measure for overcoming some of these factors. Moreover, while the Master Plan made good use of recent conceptual paper on supplementation and artificial production (Williams et al. 2003), the focus of the Master Plan should be on its complementarity to (or intended departure from) the Fish and Wildlife Program's basinwide artificial production standards and the ISAB supplementation review and other ISAB and ISRP documents. The Master Plan's activities should be proposed within the context of these documents.

[2] For the most current iteration of the Okanogan Subbasin Plan and related documents see: www.nwcouncil.org/fw/subbasinplanning/okanogan/default.asp

ISRP reviewers were unable to locate some basic information regarding assumptions for analyses. These will need clarification or greater transparency in the Master Plan revision. Specifically, both recovery and harvest actions are, in fact, based upon in-basin and out-of-basin assumptions concerning survival to hatch or smolt, smolt to adult return rates, catch rate and handling efficiencies, and so on. These assumptions need to be explicitly addressed within the context of the general conceptual and specific mathematical models used to predict both harvest and recovery successes. As one example, it ought to be possible to specify particular out-of-basin harvest rates that are likely to lead to in-basin return rates. In the Okanogan Subbasin Plan, there are sections that would be highly relevant (e.g., out of basin considerations). For example, the plan calls for various maximum threshold levels of artificial propagation integration into wild production. Is there a supported rationale for these thresholds (i.e., why not different levels)? Are these levels achievable? Theoretically as the percent of returns from wild production increases, harvest efficiency of marked fish will go down and handling of wild fish will increase. Such inherent conflicts need to be addressed at the outset. What if such levels are achieved and there remains impact on wild fish? Reviewers consistently had trouble reconciling just how the numbers of wild adults (as a performance measure) would be reached under current conditions (hatch rates, survival to smolt, smolt to adult survival) without inundation of the current wild population with hatchery-derived fish. If wild spawning habitat is not presently limited, removing ~ 500 adults for brood purposes will decrease (at least in the short-run) some potential for natural production. Compound this reduction with a potential large-scale increase in artificial production – for multiple generations, perhaps – and the recovery goals for wild production seem quite out of reach. Ultimately, the Master Plan should have a very explicit analytical model that demonstrates the complementarity of the outlined Conservation Actions – especially Integrated Harvest and Integrated Recovery in terms of wild and hatchery fish.

Lastly, inclusion of effectiveness monitoring and programmatic evaluation toward program goals is relatively lean in the text (but is included to a greater extent in Appendix H). Effective adaptive management is firmly grounded in evaluating an action as an experimental treatment. To evaluate success (predicted response), a robust analytical design is required up front. While the Master Plan does articulate that the program will be monitored and evaluated, the specific logic and decision paths for continuing, terminating, or abandoning the management actions are not transparent. Decision models often can include visual tools such as decision trees. Some additional benefit and direction on monitoring and evaluation will emerge from the placement of this project within the Subbasin Planning context.

ISRP Comments on Step 1 Review Elements

The Council has emphasized that an important part of the Three Step Review Process includes an ISRP review of the responses to the technical elements listed below. The Council revised the original review elements, developed in 1997, to better reflect and clearly refer to the 2000 Fish and Wildlife Program (e.g., artificial production and subbasin assessment protocols). The Council specified that the ISRP apply these elements or similar standards as a reflection of the current state of the science. This is the first review that the ISRP has applied the revised review elements.

A. All Projects

Does the Chief Joseph Dam Hatchery Program Master Plan:

1) address the relationship and consistencies of the proposed project to the eight scientific principles (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section B.2) (Step 1)?

The Eight Scientific Principles:
1. The abundance, productivity, and diversity of organisms are integrally linked to the characteristics of their ecosystem.
2. Ecosystems are dynamic, resilient and develop over time.
3. Biological systems operate on various spatial and time scales that can be organized hierarchically.
4. Habitats develop, and are maintained, by physical and biological processes.
5. Species play key roles in developing and maintaining ecological conditions.
6. Biological diversity allows ecosystems to persist in the face of environmental variation.
7. Ecological management is adaptive and experimental.
8. Ecosystem function, habitat structure and biological performance are affected by human actions.

ISRP Comments: The Master Plan addresses the eight scientific principles. The dynamic nature of the ecosystem including the patterns of human intervention or influence within the Okanogan River will be key to achieving program goals.

2) describe the link of the proposal to other projects and activities in the subbasin and the desired end-state condition for the target subbasin (Step 1)?

ISRP Comments: The Master Plan does directly link to other activities in the basin, especially Proposal #29040 *Develop and Propagate Local Okanogan River Summer/Fall Chinook*, and #29033 *Design and Conduct Monitoring and Evaluation Associated with the Reestablishment of Okanogan Basin Natural Production.* The Master Plan also links directly to HCPs. Perhaps, though, the most critical linkage not described (in part because of timing of release of each) is the Okanogan Subbasin Plan (other than a simple listing in Table 6; p. 64). Moreover, the linkages between the objectives of this Master Plan and the ISAB's supplementation recommendations and other basin-wide propagation efforts deserve direct discussion.

3) define the biological objectives (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section C.2 (1) and (2), and Technical Appendix) with measurable attributes that define progress, provide accountability and track changes through time associated with this project (Step 1)?

ISRP Comments: Numerical goals are defined for smolt production and release as well as adult returns to the harvest fishery, the hatchery for brood take, and to natural production in the river itself. Whether these goals are reachable and under what circumstances (e.g., levels of ocean survival, downstream/upstream passage and survival, harvest pressure, spawning and nursery habitat availability, genetic and life-history diversity) are not only assumptions, but should also serve as testable predictions of an operational hypothesis.

A conceptual design for Monitoring and evaluation is described in Chapter 10, but lacks detail in terms of specific hypotheses to be tested and design characteristics. Appendix H contains considerably more detail. The M & E design will benefit from integration and further development of M & E in the Subbasin Plan and in the other subbasins of the Columbia Basin. In particular, the M&E plans should be made consistent with and cooperate with ongoing pilot M&E projects, e.g. "Monitoring strategy for the Upper Columbia Basin" (Hillman 2004), and "Monitoring strategy For The Duck Valley Indian Reservation" (Hillman and Dykstra 2004), and monitoring strategies for evaluation of other hatchery operations, e.g. the Northeast Oregon Hatchery (NEOH) Spring Chinook Master Plan: Monitoring and Evaluation Plan (ISRP 2004).

4) define expected project benefits (e.g. preservation of biological diversity, fishery enhancement, water optimization, and habitat protection) (Step 1)?

ISRP Comments: The Master Plan proposes two major benefits of the proposed propagation project: integrated recovery (of at-risk or extirpated Chinook salmon) and integrated harvest (for tribal ceremonial and subsistence purposes).

5) describe the implementation strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.2) as they relate to the current conditions and restoration potential of the habitat for the target species and the life stage of interest (Step 1)?

ISRP Comments: Section 5.1.4 and Table 2 estimate habitat carrying capacity for salmon and steelhead smolts as well as recent production averages for natural production (and thereby a rough estimate of the carrying capacity). If accurate, the system can handle additional production without density dependent effects counteracting production.

The primary habitat threats to the Okanogan Subbasin are listed as impaired hydrological condition due to water withdrawal, elevated summer water temperatures, sedimentation, loss of riparian vegetation. Ultimately, the Master Plan indicates that the most important limitation to

natural productivity results from out-of-basin impacts associated with poor passage through the downstream dams.

Given the level of impairment described throughout the basin from instream and out of basin dams, from water and upland land use, from modification of riparian habitat and channelization, and so on, there is clearly a legion of opportunities for habitat improvement throughout the Subbasin. Ongoing projects are considered and described in Chapter 6.

6) address the relationship to the habitat strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.3) (Step 1)?

ISRP Comments: The Master Plan indicates (in section 6.7.1) that the habitat work in current projects, such as those in Omak and Salmon Creeks, and proposed for the Antoine or Loop Loop Creeks are vital to the objectives of this project. While reasonable, more thoroughly describing this dependence will help define whether and where other analogous activities may be needed.

7) ensure that cost-effective alternate measures are not overlooked and include descriptions of alternatives for resolving the resource problem, including a description of other management activities in the subbasin, province and basin (Step 1)?

ISRP Comments: The Master Plan's Chapter 8 includes a discussion of alternatives. This section was short and briefly focused on alternatives solely for artificial production. No alternatives were discussed concerning habitat improvements, changes to the hydrologic regime in basin or out-of-subbasin, or harvest effects, and so on. The ISRP recognizes that until the entire down river hydrosystem is operated in a more ecosystem-friendly manner, natural production will be limited.

8) provide the historical and current status of anadromous and resident fish and wildlife in the subbasin most relevant to the proposed project (Step 1)?

ISRP Comments: The summary provided is adequate.

9) describe current and planned management of anadromous and resident fish and wildlife in the subbasin (Step 1)?

ISRP Comments: The Master Plan benefits from the previous HCP process – thus information is not needed to be recreated for salmon. Information about anadromous sockeye and steelhead, and resident fish and wildlife in the basin were not included as the project is specifically focused on Chinook propagation. Again, this may be enhanced by considering this Master Plan within the context of the Subbasin plan.

10) demonstrate consistency of the proposed project with NOAA Fisheries recovery plans and other fishery management and watershed plans (Step 1)?

ISRP Comments: The Master Plan addresses the condition and recovery needs for the two Chinook ESUs in question. For the Summer/Fall Chinook ESU the recovery goal of the proposed artificial production includes focusing on local stock (Okanogan), increased temporal/seasonal coverage of the run by increasing brood collection over a longer period of time, expanded set of rearing and release localities to take advantage of unused spawning habitat, limiting the escapement of hatchery-origin fish into the breeding pool. If successful at achieving demographic goals for increasing natural production of Spring/Fall Chinook, the program will simultaneously achieve broader ESU recovery goals. Ultimately, the recovery plans for both Chinook ESUs are broader than the Okanogan (as well as for steelhead and bull trout which are not directly addressed in the Master Plan).

11) describe the status of the comprehensive environmental assessment (Step 1 and 2)?

ISRP Comments: Environmental assessments for the Subbasin have been completed at a relatively coarse scale in the U.S. The Master Plan refers to and briefly describes several of these. In this regard, dovetailing this Master Plan with the Subbasin Plan would be appropriate and extremely valuable.

12) describe the monitoring and evaluation plan (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.9) (Step 1, 2 and 3)?

Reviewer Comments: Inclusion of effectiveness monitoring and programmatic evaluation toward program goals is relatively lean. Effective adaptive management is firmly grounded in evaluating an action as an experimental treatment. To evaluate success (predicted response), a robust analytical design is required upfront. A conceptual design for Monitoring and evaluation is described in Chapter 10, but lacks detail in terms of specific hypotheses to be tested and design characteristics. Appendix H contains considerably more detail. Here again, the M & E design will benefit from integration and further development of M & E in the Subbasin Plan and in the other subbasins of the Columbia Basin. In particular, the M&E plans should be made consistent with and cooperate with ongoing pilot M&E projects, e.g. in the Wenatchee, the "Monitoring strategy for the Upper Columbia Basin (Hillman 2004), and "Monitoring strategy For The Duck Valley Indian Reservation (Hillman and Dykstra 2004" and monitoring strategies for evaluation of other hatchery operations, e.g. the Northeast Oregon Hatchery (NEOH) Spring Chinook Master Plan: Monitoring and Evaluation Plan (ISRP 2004).

13) describe and provide specific items and cost estimates for ten fiscal years for planning and design (i.e. conceptual, preliminary and final), construction, operation and maintenance and monitoring and evaluation (Step 1, 2 and 3)?

ISRP Comments: The Master Plan provides cost estimates for future planning and design (i.e. conceptual, preliminary and final), construction, operation and maintenance and monitoring and evaluation.

B. Artificial Production Initiatives

Does the Chief Joseph Dam Hatchery Program Master Plan:

1) address the relation and link to the artificial production policies and strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.4 and Technical Appendix) (Step 1)?

ISRP Comments: The Master Plan does address the linkage and association to the Fish and Wildlife Program basinwide provisions and policies, but it does so primarily through listings or cross-referencing (pp. 18-20), rather than discussion of those points. The Master Plan also supplies direct comparisons to an appropriate ISAB framework (2003) and recommendations therein, as well as to the recent Landscape Hatchery Concept by Williams et al. (2003) that explores ways to integrate natural and artificial production. The Williams et al. (2003) paper has not been reviewed by Council or the independent science groups, but not surprisingly given the author list, provides many recommendations in common with the Council's program and the general recommendations from both independent science groups on artificial production and supplementation. For the purposes of this review, most useful to the Council and the ISRP are the direct and explicit linkages to the Fish and Wildlife Program and the ISAB's supplementation framework (2003).

2) provide a completed Hatchery and Genetic Management Plan (HGMP) for the target population (s) (Step 1)?

ISRP Comments: HGMPs are included for both the Summer/Fall Chinook and Spring Chinook populations as Appendices C & D.

3) describe the harvest plan (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.5) (Step 1)?

ISRP Comments: The Master Plan refers to the Management Plan purportedly being developed in the US v Oregon and Washington court proceeding. Judge Richard Belloni, shortly after his ruling in 1969, ordered the parties to that proceeding to develop a fishery co-management plan. At the present time there is no co-management plan in place (December 2004). There remains, apparently, an impasse among the parties because the activities undertaken have generally failed to deliver the fish promised. Ultimately to be effective the parties need to agree upon a set of statements about how the fisheries will proceed given the requirement within subbasin plans that call for returns of specified numbers of adults to the tributaries, fisheries, and streams. For example, what are the guiding principles for co-managing the mainstem fisheries and those in the

tributaries? What rights of access of allocation and access will be distributed for allowable harvest?

Without a Management Plan that considers treaty fishing rights and the inherent requirement for returning anadromous fish to the usual and accustomed grounds and stations of the individual tribes, this Hatchery Master Plan could be rendered meaningless and the hatchery left with no source of brood stock. The history of hatcheries in the upper Columbia Basin is full of examples -- Leavenworth NFH, Entiat, Methow, Turtle Rock, and so on. Subbasin plans adopted by the Council should provide ultimately the basis for management decisions on harvest outside and inside of the individual subbasins.

On page 45 the Master Plan says that escapement goals have not been set for the individual tributaries, Wenatchee, Entiat, Methow, Okanogan, Similkameen, and Chelan rivers, and that WDFW regulates recreational fisheries based upon combined counts of Summer/Fall Chinook at Priest Rapids Dam. Management of this fishery and tribal fisheries must become much more sophisticated if numerical goals for fish returning to individual subbasins, and hatcheries are to be achieved. It is to be hoped that the newest Management Plan developed in the US v Oregon and Washington proceeding will specify a process to be used that will take into account this problem.

The Master Plan also notes that the Colville Confederated Tribes are not a party to US v Oregon and Washington. As a result, there is a danger that stocks from the Okanogan and Similkameen rivers might be left out of the Management Plan under development. It is essential that disagreements from this potential problem be recognized and all appropriate steps taken to ensure that all stocks in the Columbia Basin be included in the resulting Management Plan adopted by the Court.

4) provide a conceptual design of the proposed facilities, including an assessment of the availability and utility of existing facilities (Step 1)?

ISRP Comments: A conceptual design is provided with linkage to and utility of existing facilities.

5) provide a preliminary design of the proposed facilities (Step 2)?

ISRP Comments: While this is not required for Step 1 (it is a Step 2 issue). Many of the preliminary design specifications are included.

6) provide a final design of the proposed facilities, including appropriate value engineering review, consistent with previous submittal documents and preliminary design (Step 3)?

ISRP Comments: Not applicable for this Step of the review (this is a Step 3 issue).

Additional Specific Comments and Questions from ISRP

1. While the WDFW hatchery is mentioned, along with their acclimation ponds in the Similkameen, some additional text is warranted to include a fuller discussion of potential interactions of fish from that facility with the proposed Chief Joseph Hatchery. A separate section would be warranted that would describe the background of the WDFW Hatchery, which is funded by a Public Utility District as a mitigation facility. This information puts the Chief Joseph proposal in a broader context than an isolated mitigation effort for one dam.

2. p 14 - Critical Research Needed: a. The first three points under Critical information for CJDHP are not research at all (NEPA review, ESA review, and water supplied). The issue of water supplies relates to three water supplies for the hatchery but does not seem to address concerns about agreements with the Okanogan Irrigation water needed for the Salmon Creek restoration … or more generally for water quality in the subbasin generally. b. The information from a radio-telemetry study would be useful and should likely proceed. c. Research on live-capture, selective gear for broodstock is likely necessary. What if efficiency from research proves to be low or not selective? (and what levels are acceptable?) Will this trigger suspension of the entire program? On page 44, the current harvest rates are very low and we question the capability of these fishers to meet their goals of managing the ratio of hatchery and wild fish in the Okanogan River tributaries.

3. pp 18-21 - Consistency with Council Requirements: the response format is highly uninformative. Some well-crafted prose is appropriate for each section clearly demonstrating this consistency.

4. p 21 - the authors suggest "In its entirety, the proposed CJDHP falls nearest the landscape perspective end of the continuum …", this is a cement trough hatchery design with some acclimation ponds, how normative are those?

5. p 40 - Ecological Rationale: Note that NOAA now has 2004 Status Reviews available.

7. p 40, Section 5.1.2 – a. What is the evidence for two distinct runs in the Okanogan summer/fall chinook? Were they historically different or could the present separations be an artifact of past fishing? Relative to the entire ESU, how different (genetically, evolutionarily) are these two runs? b. 3rd paragraph: some very interesting comments here, what is the basis for them? The critical issue would seem to be whether all summer/fall juveniles leave the Okanogan before the warm summer periods (i.e., as under-yearlings) and their timing.

8. p 41, 5.1.3: The text provides percentages to describe hatchery vs. wild ratios and distribution of spawners … could a table of values or a graphical figure be provide so that we see and evaluate an historical perspective on the returns?

9. p 42, 5.1.4 Habitat Capacity: while this could be an important section, there is no technical basis of the numbers provided and it is not even clear what the values in Table 2 actually refer to? How would the "Recent 10-yr Average" be determined? Continually referring to other

large reports is not useful … or convincing. To improve treatment of this issue, the text needs to be enlarged in this respect, to at least assure a well-reasoned logic path. Reference to an appendix might be okay if details are needed to support the text. But as it stands – as for example the statement about modification of the BAMP recommendations – there is not even a statement about what the modifications were or what the justification might have been. This is a key document that has broad implications for hatchery decisions in the mid-Columbia region.

10. p 46, 5.2.3 Summary: (1) first paragraph: The statement is made that juvenile and adult mortality associated with passage through nine downstream dams is the "most significant factor limiting productivity of naturally-spawning populations of summer/fall Chinook." Considering that this is not tied in with the Subbasin Plan, is this a supportable conclusion (e.g., EDT or other appropriate analysis). This is a common theme throughout the Master Plan and needs substantiation. One alternative approach is to develop a life cycle model to examine these claims. (2) The claims in the second paragraph should be supported with documentation or data. Perhaps some basic data plots from counts through the season at Wells Dam might help determine whether the early versus late run chinook have suffered different mortalities or are suffering the same fates?

11. p 48 - Local Context: for sections 6.1 through 6.6 there is little to review from a scientific perspective, except that the maps and figures might be enlarged or improved in print quality.

12. p 65 - Is there a "take-home" message from presenting a partial lists of projects with no real indication of completion/success, inter-relationships among projects, or results relevant to this Master Plan? There are vague comments to recent large monitoring projects but no indication of how consistent this Plan would be with those large monitoring programs or how they support each other.

13. p. 68, Regional Context: again the comment is made that "the toll the dams take on Okanogan subbasins … is still the greatest limiting factor to this population." Again, no evidence is presented. Surely there are estimates of the mortality rates past the dams, but what are they comparing these comments against in the Okanogan subbasin?

14. p 79. The current scale of the program would produce between 6K to 29K adults but some comments suggest that the initial or early program would favor recovery objectives and then expand to harvest benefits once the natural populations were established. However, other comments suggest substantial monitoring and assessment, and it is not clear how their objectives were determined. For example: "fisheries will also be managed to **optimize** the escapement of hatchery-origin fish to the spawning grounds", or that the numbers of fish released will depend "directly on **response** of the natural-origin populations". It is not at all clear what these statements mean, or how did they determine the proportion of hatchery fish to allow on the natural spawning grounds – are these supportable with some analysis? Provide a reference.

15. p 79, 9.4.2 Conservation Action 1: this section refers to "the full continuum in run timing" … but Table 10 then reverts to production targets by early and late components of the run. Will focusing on the extremes truly result in a full continuum?

16. p 80, Table 10: The Early chinook stock indicates that 1,070 adults are needed but the table only accounts for 512 spawners. Is the difference due to the existing program, but if so, the brood numbers are not proportional to the juveniles released. How is this explained?

17. At low abundances, the broodstock rules suggest that only 400 could be taken when the returns are <2,000 at Wells Dam. Does this mean that the facilities will not be fully utilized in those years? These kinds of operational responses might be included in a formal decision model or decision tree that incorporates risk management.

18. Table 10. Late stock indicates 618 adults but page 81 refers to 616 adults??

19. p 81, 9.4.3.2, bottom of 2nd para. - "… higher productivity of hatchery populations is factored into the broodstock collection protocol …" This kind of statement requires some transparent demonstration as it is not obvious.

20. p 81, 9.4.3.2 for Late-arriving fish … if late-arriving chinook are depressed and have not recently been supplemented, did they consider just using a large sample collected at Wells Dam and avoid any impact on the remaining natural fish in the Okanogan? The same question could be asked of the program generally. What are the trade-offs of initially collecting a large sample of fish at Wells Dam from throughout the full run-timing to avoid impacting the existing natural populations by removing brood as compared to more specific sampling by stock and timing as proposed in the Master Plan? An examination of the economic, biological, and genetic trade-offs of these two differing approaches might be worthwhile. Collection over the duration of the run would protect the wild population from brood mining, but may lead to stock mixing.

These fish could provide an increased genetic and life-history diversity and assist with filling in the gap between the early and late fish. The program could mark the hatchery fish they want removed (for harvest or reduction of hatchery spawners) but leave a portion of the fish unmarked for supplementation of the natural spawning population … what would the arguments be for or against this?

Ultimately, the sponsors should exercise caution in simply trading one risk set for a different set. Such decisions will greatly benefit from more formalized risk assessment and management strategies.

21. p 83, 9.4.6 - "… In years with lower escapements, the sustainability of the population may best be served by allowing a greater proportion of the locally adapted hatchery-origin fish on the spawning grounds." This will suspend any maxima imposed on percentage of hatchery fish on the spawning grounds. How "years with lower escapements" is defined and measured will be pretty critical.

22. p 84, Table 13 - Both rows of this table only refer to Early-Arriving Chinook.

23. p 84, 9.5.3 Harvest - How will bi-catch of Okanogan sockeye be addressed and monitored? What are the expected impacts and are there any concerns expressed by the Canadian Government or First Nations?

24. p 85, 9.5.4 Harvest Action 3 - "Production and harvest will be managed to optimize escapement of hatchery fish to the benefit of the natural population." Good words, but no idea what 'optimize' means in this context. This phrase is used several times but there is no technical basis presented for what optimize means. How was the percent hatchery maximum value determined?

25. p 86, 9.6.2 Incubation: "up to 10% surplus eggs to ensure program release goals …" This is just another unnecessary set-back to the natural population. Couldn't 10% simply be compensated for within juvenile rearing and is there any evidence that releasing 10% fewer juveniles would ever be noticed in returns?

26. p 87, bottom left column … perhaps, simply a wording error … "with a sample size of fish to ensure acclimation conditions are suitable to ensure fish survival." The intent or meaning is unclear.

27. p 88. Effect on ESA listed Species - a) "Spring Chinook" … While this appears a reasonable conclusion, the early fisheries should nonetheless be monitored. b) Steelhead, section 9.7.1.2, bottom of 2nd paragraph … these comments are basically just assumptions and need to be tested or monitored.

28. pp 94-97, Monitoring and Evaluation Program Conceptual Design: Specifics on methods, designs (including controls), and hypotheses are explicitly needed. While the Appendix is more detailed, there does need to be some detail in the main body text. We need to see what data can be collected and what hypotheses will be tested. What are the critical uncertainties that should be addressed, do they even know what to monitor? To monitor these stocks, the program needs to evaluate annual changes in natural survival rates, exploitation rates and patterns, and establish evaluation standards for comparisons … again; there is no mention of any controls in the studies. But if the program is to be adaptive, as it suggests, there needs to be a set of hypotheses stated and responses planned depending on the outcome of those studies.

29. p 98. Objective 3 Methods - first comment on tagging natural fish … how will this be done?

30. p 146 - program can be implemented for "very little additional cost". Actually the costs are not little (32% increase over the summer/fall program in capital costs only, plus annual operational costs) … however, they should be compared against cost associated with implementing this program later as opposed to concurrent to the summer/fall program.

31. p 148 - last sentence of 2nd paragraph: clarify the meaning "were once captured"

32. p 148 - last sentence of 4th paragraph: "broodstock collected from these three Cascade …, with particular dependence on the Leavenworth …" Isn't this four hatcheries? Clarify.

33. p 150, 2 points of significance to note on this page which to our knowledge have not been undertaken or completed:

a) the list of significant environmental factors limiting spring chinook, and
b) during recovery/restoration efforts, US v Oregon will need to account for the Colville Tribal fisheries ….

34. p 151 Ad Hoc Experimental releases: note the risk of this program, loss of fish in both 2003 and 2004. Also, P. 152, 13.3.2.2: Why are these releases described as Isolated and Experimental?

35. p 152. Alternatives Considered: The section contrasts "natural re-colonization" versus "Assisted Relocation" and using "ESU Listed Species (i.e., the remnant Upper Columbia R spring chinook) or Carson Hatchery spring chinook. The authors propose six options using various combinations but ultimately recommend #5 - an integrated recovery and isolated harvest plan using Carson stock initially and then Methow composite stock when available.

They state (bottom of page 152) "This option was selected because [it] has the greatest likelihood of meeting both the recovery and harvest goals of the Colville Tribes, while also presenting the least risk to other fishery resources and objectives in the Columbia Cascade Province."

While we cannot challenge the accuracy of the first half of this statement, we challenge the accuracy of the second half due to potential impacts on the ESA Listed Species. The Program would use Carson stock initially but will try to establish naturally spawning populations. When Methow composite stock is available, they will try to re-introduce this stock with the naturally spawning Carson-based stock and interactions would obviously be expected. It is very likely that an established natural population would limit the success of a newly introduced stock (i.e., the Methow composite). If this occurred, the Carson-based stock should also be considered a threat to the ESA Listed Stock in other nearby systems.

Ultimately, are there different re-introduction approaches that do not use Carson stock at all, but build gradually using Methow composite stock. The early program emphasis should be on habitat restoration, in particular acquiring water and restoring flows in the Omak and Salmon rivers.

36. p 160, 13.8.1 Potential Risk: DNA or some other appropriate inherited marker may provide some additional analytical power for quantifying interbreeding and assessing risks.

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